

nic acid pathway:

Glucose  $\xrightleftharpoons{\text{mutase}}$  Glucose-6-phosphate (G6P)  $\xrightarrow[\text{UTP} \rightarrow \text{PP}_i]{\text{UDP-glucose 6-phosphate dehydrogenase (UDPGDH)}}$  UDP-glucose 6-phosphate (UDPG)  $\xrightleftharpoons[2\text{NAD}^+ \rightarrow 2\text{NADH} + \text{H}^+ + \text{H}_2\text{O}]{\text{UDP-glucose 4-epimerase (UDGE)}}$  UDP-glucose 4-phosphate (UDG4P)  $\xrightarrow[\text{oxidation @ C6 to carboxylic acid}]{\text{UDP-glucose 4-epimerase (UDGE)}}$  UDP-glucose 4-phosphate (UDG4P)  $\rightarrow$  glucuronides

① Formation of UDPG  
② detoxifying agent  
③ non-phosphorylated pathway

Diagram illustrating the regulation of Galactose Metabolism by Glucose-6-phosphate (G6P) and Galactose-1-phosphate (Gal-1-P):

**Galactose Metabolism Pathway:**

- Galactose is converted to Gal-1-P by the enzyme **galactokinase** (1), using ATP and producing ADP.
- Gal-1-P is converted to UDP-gal by the enzyme **UDP-galactose 4-epimerase** (3), using NAD<sup>+</sup> and producing NADH.
- UDP-gal is converted to UDP-glucose by the enzyme **UDP-glucose 4-epimerase** (2), using NAD<sup>+</sup> and producing NADH.
- UDP-glucose is converted to G6P by the enzyme **phosphoglucomutase** (4).

**Regulation of Galactose Metabolism:**

- G6P inhibits **galactokinase** (1) and **phosphoglucomutase** (4).
- Gal-1-P inhibits **UDP-galactose 4-epimerase** (3).

**Glucose Metabolism Pathway:**

- Glycogen is converted to UDP-glucose.
- UDP-glucose is converted to G6P by the enzyme **pyrophosphorylase**, using UDPG and producing UTP and P<sub>i</sub>.

**Regulation of Glucose Metabolism:**

- G6P inhibits **pyrophosphorylase**.

**Galactose Metabolism Regulation Summary:**

- Galactose metabolism is regulated by G6P and Gal-1-P.
- G6P inhibits galactokinase and phosphoglucomutase.
- Gal-1-P inhibits UDP-galactose 4-epimerase.

Fructose  $\xrightarrow[\text{Mg}^{2+}]{\text{ATP} \rightarrow \text{ADP}}$  F6P  
Hexokinase

mannose:  $\text{mannose} \xrightarrow[\text{Mg}^{2+}]{\text{ATP} \rightarrow \text{ADP}} \text{M6P} \xrightleftharpoons[\text{Hexokinase}]{\text{Kontrollierte}} \text{F6P}$   
(C<sub>2</sub> epimer)

Fructose  $\xrightarrow[\text{Fructokinase (not regulated)}]{\text{ATP} \rightarrow \text{ADP}}$  FIP

② HF I: hepatic failure  
↑ FIP

to no regulation of  
fructokinase  
↑ glycolysis + lac  
↑ lactic acidosis  
hypoglycemia

galactose

### Entry of Hexoses in Glycolysis:

# Glucose

hexo/  
gluco khad

GLP

some raise

mannose

Fructose

Wünsche

CC<sub>4</sub>-C<sub>6</sub>  
aldehyde  
C<sub>3</sub>)

Fructose  
(liver)

Worldeu

ATP  
↓  
NDP

GAP (3)

glycolytic pathway